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Abstract

Early onset in adolescent gambling involvement can be a precipitator of later gambling problems The aim of the present study was to test the preliminary efficacy of a web-based gambling intervention program for students within a high school-based setting. Students attending a high school in Italy (N = 168) participated in the present study (58% male – age, M = 15.01; SD = 0.60). Twelve classes were randomly assigned to one of two conditions: intervention (N = 6; 95 students) and control group (N = 6; 73 students). Both groups received personalized feedback and then the intervention group received online training (interactive activities) for three weeks. At a two-month follow-up, students in the intervention group reported a reduction in gambling problems relative to those in the control group. However, there were no differences in gambling frequency, gambling expenditure, and attitudes toward the profitability of gambling between the two groups. In addition, frequent gamblers (i.e., those that gambled at least once a week at baseline) showed reductions in gambling problems and gambling frequency post-intervention. Frequent gamblers that only received personalized feedback showed significantly less realistic attitudes toward the profitability of gambling post-intervention. The present study is the first controlled study to test the preliminary efficacy of a web-based gambling intervention program for students within a high school-based setting. The results indicate that a brief web-based intervention delivered in the school setting may be a potentially promising strategy for a low-threshold, low-cost, preventive tool for at-risk gambling high school students.

Keywords

Gambling; High school; Web-based intervention; Personalized feedback; Online activities

1. Introduction

Youth problem gambling has become an emerging public health issue in many countries (e.g., King, Delfabbro, Kaptsis, & Zwaans, 2014; Molinaro et al., 2014a), and a recent Italian study (Molinaro, Potente, & Cutilli, 2014) estimated a past-year problem gambling prevalence rate of 7.5% among high school students (ages 15–19 years). Although there is an age limit of 18 years for gambling in Italy, 44% of students (aged between 15 and 19 years) reported having engaged in some form of gambling during the past year (Molinaro et al., 2014b). In addition, problem gambling among high school students has been associated with significant health and psychosocial problems (Blinn-Pike, Worthy, & Jonkman, 2010). Gambling becomes a problem[1] when gamblers lose control and cause harms to themselves, their family, friend or society (Ferris & Wynne, 2001; Neal, Delfabbro & O'Neil, 2005).

Gambling from an early age is associated with more severe gambling behaviors (Granero et al., 2014) and may predict depression, substance use disorders, and other psychiatric concerns in adulthood (Grant, Potenza, Weinstein, & Gorelick, 2010). It has been shown that the proportion of young people displaying problematic levels of gambling has remained very stable from adolescence to adulthood (Slutske et al., 2003; Winters, Stinchfield, Botzet, & Anderson, 2002). Thus, previous studies indicate that early onset in adolescent gambling involvement can be a precipitator of later gambling problems, suggesting a need to design prevention and intervention programs for high school students during mid-adolescence (e.g., aged 15 years). Recent solutions to the problem of excessive gambling have involved the development of different types of computer-delivered interventions (e.g., Cunningham, Hodgins, Toneatto, & Murphy, 2012; Monaghan, 2009; Wohl, Parush, Kim, & Warren, 2014). For this reason, the principal aim of the study is to evaluate the efficacy of a web-based gambling intervention program for high school students.

1.1. Early onset and adolescent gambling: implications for prevention and intervention

One possible explanation for the early onset and liking of gambling is that this development period is related with a high level of risky decision-making (e.g., Albert & Steinberg, 2011). Although adolescents have the capacity to evaluate the costs and benefits of their choices, they have lower levels of deliberative decision-making than young adults (e.g., Ariely, 2008; Canale, Vieno, Griffiths, Rubaltelli, & Santinello, 2015a). Previous studies have shown that gamblers with more 'myopic' (i.e., focused on the present) decision-making are more susceptible to the diverse range of cognitive distortions that occur during play, such as beliefs in superstitions and rituals, and the failure to appreciate independence of turns (Michalczuk, Bowden-Jones, Raylu, & Oei, 2004; Verdejo-Garcia, & Clark, 2011). These findings suggest that cognitive factors are relevant mechanisms underlying adolescent gambling problems, indicating the need for prevention and intervention efforts that target gambling-related cognitions.

As irrational gambling-related cognitions and misunderstandings linked to randomness and probabilities are some of the crucial aspects contributing to the initiation and maintenance of problematic gambling (see Goodie & Fortune, 2013 for a review and meta-analyses), previous studies have found that problematic gambling behavior can be decreased in response to cognitive-behavioral therapy (CBT; see Fortune & Goodie, 2013 for a review). A small body of empirical research has also shown that educational programs about erroneous beliefs can successfully help change the targeted cognitions (Wohl, Christie, Matheson, & Anisman, 2010; Wulfert, Blanchard, Freidenberg, & Martell, 2006). As people's behavior can be a direct result of how people think cognitively, correcting people's thinking and misbeliefs may lead to a desired behavioral change (Delfabbro, 2004).

Previous research has also indicated that the way information is presented and communicated is also significant. Several studies have shown that interactive message and animated information are more efficacy in changing irrational belied patterns and behavior than static message (Auer & Griffiths, 2015; Monaghan & Blaszczynski, 2010). Social psychological models also highlight that personal attitudes and normative perceptions can be predictors of behavioral

intentions in disordered gambling (Larimer & Neighbors, 2003; Moore & Ohtsuka, 1999). Consistent with these models, motivational interviewing (MI; Miller & Rollnick, 1991) an approach that highlights discrepancies between behavior and attitudes/perceptions while enhancing motivation and self-efficacy for behavior change has also been advanced as a treatment for pathological gambling (Petry & Armentano, 1999). MI integrated with skills training and personalized feedbacks resulted efficacious in reducing gambling among college students (Larimer et al., 2012).

Both CBT and MI are two promising approaches to the prevention of disordered gambling in college populations (e.g., Larimer et al., 2012). In spite of these useful approaches, adolescents may be considered an at-risk group because they tend to underestimate gambling risks and often fail to be referred to or seek treatment for gambling problems (Blinn-Pike et al., 2010; Chevalier & Griffiths, 2004) because, for example, there are few or not appropriate and/or suitable treatment programs available for adolescents (Griffiths, 2001). Lack of problem recognition is also a significant factor (Cunningham, Hodgins, & Toneatto, 2011; Monagham & Wood, 2010).

1.2. Web-based intervention for reducing gambling during adolescence

Given that adolescents do not access treatment or fail to ask for help, there is a need to improve accessibility to tools that at-risk and problem gamblers can use outside of formal clinical treatment services. Furthermore, as problem recognition appears to be an important barrier to prevention-treatment access, internet-based screeners for problem gamblers are one way of increasing accessibility (Cunningham et al., 2011). More recently, innovative approaches to implementing electronic screening and brief interventions have been developed. Web-based intervention (WBI) may be advantageous because the confidentiality and non-judgmental quality of the Internet may increase the potential for youth to divulge personally relevant details, which may facilitate knowledge or behavioral change (Chiauzzi, Green, Lord, Thum, & Goldstein, 2005; Griffiths & Cooper, 2003). Graphics used in WBIs may also appeal to adolescents (e.g., facilitate a

stronger emotional response than text in educational settings), thus increasing their interest in reading the feedback (e.g., Lu, Kim, Dou, & Kumar 2014; Mohammadi, Abrizah, Nazari, & Attaran, 2015; Tevyaw & Monti, 2004). WBIs may also be convenient in the high school context as online information and guidance has the potential both to reach a wide audience and be an engaging medium for students who enjoy using the Internet. Additionally, a WBI is well suited for the school setting as many of the difficulties associated with implementing traditional brief interventions can be reduced by the use of technology (Doumas, Esp, Turrisi, Hausheer, & Cuffee, 2014; Griffiths & Cooper, 2003; Moyer & Finney, 2005). More specifically, WBIs are relatively inexpensive and require minimal training, thereby reducing the resources required of schools to adopt the program.

1.3. The present study

WBIs are being increasingly implemented and evaluated to reduce some types of high-risk behavior amongst adolescents (e.g., alcohol use). There has also been a small amount of research that has examined internet-based intervention for problem gambling among adults (e.g., Carlbring & Smit, 2008; Cunningham et al., 2012; Griffiths, Wood, & Parke, 2009; Larimer et al., 2012; Martens et al., 2015; Neighbors et al., 2015). Given the paucity of research examining the efficacy of WBIs for adolescent gambling (Gainsbury & Blaszczynski, 2011; Donati, Chiesi, & Primi, 2013), and consistent with the theoretical backgrounds reviewed, the purpose of the present study was to test the preliminary efficacy of a theory-driven WBI program based on CBT and MI models in reducing gambling behaviors and gambling-related problems among students in their mid-adolescence (e.g., 15 years old). To the authors' knowledge, this is the first study to examine a WBI implemented via the school for ninth grade students. In addition, since previous studies have suggested that the effectiveness of the intervention is moderated by individual differences at baseline, such as alcohol-related negative consequences (Canale, Vieno, Chieco, Santinello, & Andriolo, 2015; Palfai, Zisserson, & Saitz, 2011), a secondary objective was to examine whether

the intervention would be differentially effective for frequent gamblers (FGs) at baseline (i.e., before intervention).

1.4. Hypotheses

Hypothesis 1: It is hypothesized that compared to the control condition at follow-up, students receiving the WBI would report: (i) lower rates of gambling (gambling frequency, gambling problems, and gambling expenditure), and (ii) more realistic attitudes about the profitability of gambling as assessed using the Gambling Attitudes Scale (GAS; Delfabbro & Thrupp, 2003; Italian version: Primi, Donati, Bellini, Busdraghi & Chiesi, 2013).

Hypothesis 2: It is hypothesized that compared to non-frequent gamblers at follow-up, frequent gamblers at baseline would show a greater reduction in gambling-related characteristics (problems, frequency and expenditure) and more realistic attitudes of gambling.

2. Methods

2.1. Participants

Participants were recruited from a high school in Italy. All ninth grade students with parental consent who were present during the baseline assessment (N = 223) were given an opportunity to participate in the study. Of these, 168 (58% male) students completed the two-month follow-up survey. Participant ages ranged from 14 to 18 years (M= 15.01, SD= 0.60).

2.2. Procedure

One school received an invitation to participate and written information about the study was sent to the headmaster at the participating high school. At meetings with the teachers, the purpose of the study, the process of recruitment of the participants, the evaluation methods, and the online program were presented. The study was cluster-randomized (i.e., the high school classes, but not the students, were randomly assigned to either an intervention or a control group) and the 12 classes (all of the ninth grade classes at school) were randomly assigned to two groups: intervention (n=6) and

control (n=6). Student randomization was not considered possible under the conditions of this school-based gambling intervention study as it would have interfered with ongoing relationships with students, as well as being highly likely to suffer contamination from what? Not clear. Although the intervention was completed individually on a computer, students may have known one another well enough to share information (e.g., students in the control group may have been aware of the online activities that characterized students in the intervention group). The intention was to recruit students naturally in their usual context of work (classes), and to deliver interventions within routine conditions. To avoid contamination of treatments, we randomized by school (e.g., Kriemler et al., 2009). I don't understand what 'contamination of treatments' means

All ninth grade students registered at school were eligible to participate. Parental permission to participate and informed consent for everyone were obtained. All participants (students and parents) were informed that all data would be treated confidentially. All students were recruited to participate by the school during class periods. Research assistants attended classes to explain the research opportunity and invited students with parental consent to participate. Students were assigned a unique pin number and the URL for participation. Students logged on to the website and were routed to a baseline survey, which was completed immediately. The online survey took approximately 10 minutes to complete. Students had an additional class meeting in which research assistants attended the class and guided the students through logging onto the online intervention. All students who participated in the baseline survey were invited to complete a two-month survey. Procedures for administration of the two-months survey were similar to those of the baseline survey.

2.3. Measures

2.3.1. Gambling behavior

Gambling behavior was assessed using the South Oaks Gambling Screen–Revised for Adolescents (SOGS-RA; Winters, Stinchfield, & Fulkerson, 1993; Italian version: Chiesi, Donati,

Galli, & Primi, 2013). Participants were initially asked to indicate the frequency of gambling in a list of ten different gambling activities (e.g., cards for money, bets on sports teams, etc.). Participants indicated how often they engaged in each of these activities over the past 30 days ("never", "less than monthly", "monthly", "weekly" and "daily"). FGs were identified as those who gambled weekly or more often (Delfabbro & Thrupp, 2003). Participants were also asked their typical monthly *gambling expenditure* (five options ranging from "0 Euros" to "91 or + Euros"). Following this, they were presented with 12 "yes-no" items to assess negative feelings and behaviors associated with gambling, which are scored 1 or 0, respectively. The sum of these items is the total SOGS-RA score, referred to as the "narrow" criteria (Winters, Stinchfield, & Kim, 1995). Hence, total SOGS-RA score (*gambling problems*) was one of the possible outcomes (α = .65, 95% CI [.57, .73] at baseline, α = .71, 95% CI [.64, .77] at follow-up). Following the standardized questionnaires of the European School Survey Project on Alcohol and Other Drugs (Hibell et al., 2012), questions regarding *gambling frequency* ("On how many occasions (if any) have you bet money? In the last 12 months and in the past 30 days"; seven options ranging from "0" to "40 or more") were also included.

2.3.2. Attitudes toward the profitability of gambling

Young people's economic perception of gambling was measured using the Gambling Attitude Scale (GAS; Delfabbro & Thrupp, 2003; Italian version: Primi et al., 2013). The scale contains nine Likert-type items using a 5-point scale ranging from "strongly agree" to "strongly disagree", yielding a maximum score of 45. Total scores on the scale were calculated so that high scores corresponded to an optimistic perception of gambling (Delfabbro & Thrupp, 2003). The internal consistency of the GAS was adequate (α = .70, 95% CI [.62, .76] at baseline, α = .81, 95% CI [.77, .85] at follow-up).

2.4. Web-based Intervention

The WBI was designed to change attitudes of gambling, gambling beliefs, and gambling behavior by providing personalized feedback (PF) regarding individual status for developing gambling-related problems, and accurate information about cognitive distortions, independent events, and myths related to gambling. The WBI, based on CBT and MI models, was developed together with a panel of prevention experts that has previously implemented evidence-based substance abuse prevention strategies (mainly cognitive and behavioral) and a computer-delivered intervention to prevent alcohol abuse and its adverse consequences among university students (Canale et al., 2015; Disperati et al., 2015).

More specifically, the tailored feedback messages provided in the WBI were developed based on the integrated model for exploring motivational and behavioral change (I-Change Model), a model composed of an integration of various social cognitive theories and models (e.g., Cremers, Mercken, Oenema, & de Vries, 2012). According to the I-Change Model, motivational factors, such as attitude, social influences and self-efficacy expectations determine an individual's intention to change. In addition, individual abilities (e.g., being able to plan specific actions to reach the target behavior), can promote behavioral change. Thus, feedback messages are principally focused on knowledge, attitudes and individual abilities.

The program includes three sections: (i) online screening, (ii) personalized feedback, and (iii) online training (interactive activities). The online screening consists of basic demographic information (e.g. gender, age) and information on gambling behavior, and gambling-related attitudes. Immediately following the assessment, PF for the respondents was generated on the computer screen. PF based on the assessment screening was provided using a form created by a panel of experts in the field of WBI among young people (Canale et al., 2015; Disperati et al., 2015). Feedback starts out with a summary of their SOGS-RA along with a description of their scores (no problem, at-risk, and problem gambling). The students were then provided with a list of consequences of gambling for health and quality of life. The PF continues with a list of tips that the person could adopt to lower the risk associated with their gambling. Finally, referral information for

online training was provided. Following the PF, students are invited to complete online training for three weeks. Participants logged onto the website and were routed to the online activities of the week, which can be completed either immediately or at any other time of the same week. The online activities[2] are designed as a 'question-and-answer' game to be played individually (see Table 1). Students are given a unique identification number, which they can use to go back into the online program to review their feedback or re-take the activities of the week. Students in the control group received only the PF based on online assessment, without additional online training.

[INSERT ABOVE HERE TABLE 1]

2.5. Statistical Analyses

Baseline measures between intervention and control conditions were compared with analysis of variance (ANOVA) for continuous variables and chi-square tests for categorical variables. Outcome variables were examined with repeated measures analyses of variance for a design including two between- subject factors, each with two levels (Group, Control or Intervention; FGs at baseline, Yes or No), and one-within-participants factor with two levels (Time, Baseline or Follow-up). Effect sizes are reported for all statistical analyses[3].

3. Results

3.1. Preliminary Analyses

All outcome variables were examined for skew and kurtosis at baseline and follow-up assessments. As the distribution for gambling problems, gambling frequency, and gambling expenditure at baseline and follow-up assessments deviated from the normal distribution, a logarithmic transformation was used to normalize the distributions (Tabachnick & Fidell, 2007). In Table 2, the demographic characteristics at baseline are presented. There were no differences between intervention or control on demographic and baseline characteristics. At baseline, 123 (73.2%) had no gambling problem, 31 (18.5%) were at-risk gamblers, and 14 (8.3%) were problem gamblers. In addition, of the 168 students, 54 were FGs at baseline (32%).

[INSERT ABOVE HERE TABLES 2 AND 3]

3.2. Effectiveness of the intervention

Test of Hypothesis 1: Improvement in intervention group over time

A Generalized Linear Model for repeated measures was used to investigate the effectiveness of the intervention in reducing gambling patterns. Results for gambling problems are reported in Table 3. As expected, there was only an effect of the Time (T) x Group (G) interaction. While on average there is no overall difference between the two groups, the time course for the two groups is significantly different. Bonferroni-adjusted pairwise comparisons indicated that those in the intervention group had significant improvement from baseline to follow-up. In addition, there was non-significant deterioration between those in the control group. Thus, gambling problems significant decreases in the intervention group and not significantly increases in the control group (see Figure 1). For the variables assessing gambling frequency, gambling expenditure, and gambling attitudes analyses did not show a main effect of intervention on these outcomes (Table 3). In short, support for Hypothesis 1 was mixed. Compared to the control group, the intervention group experienced a decrease in gambling-related problems at follow-up.

Test of Hypothesis 2: Differential effects of intervention for FGs at baseline

Moreover, a Generalized Linear Model for repeated measures was used to examine whether WBI would be differentially effective for FGs at baseline. For the variable assessing gambling problems, intervention effect was qualified by an interaction with FGs at baseline (FG). Bonferroni-adjusted pairwise comparisons indicated that for those who were FGs at baseline, there was an improvement from baseline to follow-up in the IG, but there was no significant deterioration from baseline to follow-up in the control group. However, there were no differences for those who were non-frequent gamblers (NFGs) at baseline in either group. Thus, gambling problems for the FGs at baseline significantly decreased in the intervention group but they did not significantly increase in the control group (Figure 2). For the variable assessing gambling frequency, the TxGxFG

interaction was significant (Table 3). The intervention appeared to influence gambling frequency differentially for those who were FGs at baseline.

Bonferroni-adjusted pairwise comparisons indicated that for those who were FGs at baseline, there was an improvement from baseline to follow-up in the intervention group, but there was no significant deterioration from baseline to follow-up for those in the control group. However, there were no differences between those who were NFGs at baseline in either group. Therefore, gambling frequency for the FGs at baseline significantly decreased in the intervention group but they did not significantly increase in the control group. In addition, there were no significant effects for gambling expenditure. Finally, for the variable assessing gambling attitudes, the TxGxFG interaction was significant. The intervention appeared to influence gambling attitudes differentially for those who were FGs at baseline. Bonferroni-adjusted pairwise comparisons indicated that for those who were FGs at baseline, there was a non-significant improvement from baseline to follow-up in the IG, but there was a significant deterioration from baseline to follow-up for those in the control group. However, there were no differences between those who were NFGs at baseline in either group. Results showed that GAS scores for the FGs at baseline significantly increased in the control group but did not significantly decrease in the intervention group (Figure 3). In short, the outcome data clearly support Hypothesis 2 (the only exception is the results reported on the analysis relating to gambling expenditure).

[INSERT FIGURES 1 TO 3 ABOUT HERE]

4. Discussion

This is the first controlled study to evaluate the efficacy of a web-based gambling intervention program for students within a high school-based setting. The intervention used in this study was designed to directly address risk factors for gambling, including gambling-related cognitive distortions, and realistic attitude beliefs about gambling. Results of this study provide partial

support for the online program's effectiveness in impacting these risk factors. More specifically, students receiving the WBI reported a reduction in gambling problems, whereas students in the control group reported a non-significant increase in gambling problems.

According to the results, it appears likely that informing students about irrational gambling-related cognitions and misunderstanding linked to randomness and probabilities (e.g., independence of chance events, illusion of control features, etc.) may lead to a desired behavioral change (Delfabbro, 2004; Ladouceur & Sevigny, 2003). These findings are consistent with the growing body of research indicating WBIs are effective in reducing gambling-related problems among adults (Carlbring & Smit, 2008; Griffiths et al., 2009). In addition, these results confirm the efficacy of a promising curriculum for school-based problem gambling prevention programs, such as *Stacked Deck*, comprising a set of 5–6 interactive lessons that teach individuals about the true odds of gambling, gambling fallacies, and skills for good decision-making (Williams, Wood & Currie, 2010). In contrast, there were non-significant effects related to gambling frequency, gambling expenditure, and attitudes toward the profitability of gambling. It is possible that the absence of change in expenditure was due to low rates of gambling expenditure in the past 30 days (< 10 Euros per months) among this age group. One explanation as to why the WBI did not result in significant reductions in gambling frequency and attitudes is that the program might be most useful for students with the highest baseline levels of gambling frequency and/or symptoms of problem gambling (Williams et al., 2010).

In this study, a WBI demonstrated significant reductions in gambling problems and gambling frequency post-intervention among students who were FGs at baseline. The results are consistent with previous studies, in which feedback based computerized intervention is more effective for participants with specific individual characteristics at baseline, such as hazardous drinking students (Canale et al., 2015; Palfai et al., 2011), since students who are heavier drinkers may experience feedback as more relevant and salient than those who not drink so heavily (Elliott, Carey, & Bolles, 2008). It is interesting to observe that baseline FGs receiving intervention showed

more realistic attitudes toward the profitability of gambling (even if not significant), while baseline FGs receiving only the PF about estimated risk-status and tips for safer gambling, without additional training (interactive activities), showed significantly less realistic attitudes toward the profitability of gambling post-intervention. It appears that for FGs, increasing salience about the estimated risk-status of gambling may lead to a more optimistic evaluations of gambling because they did not receive any information about irrational gambling-related cognitions and misunderstanding linked to randomness and probabilities. The increase in less realistic attitudes concerning profitability of gambling may indicate that the type of information provided in the PF may need to be modified (e.g., contain a section highlighting erroneous cognitions) to be more appropriate for this specific group of FGs.

Thus, WBI tailored to specific knowledge, attitude and ability about gambling may be a novel variant to such interventions. More, specifically providing students with feedback on correct knowledge about gambling, economic perception of gambling, and superstitious thinking could determine an individual's intention to change (e.g., Cremers, Mercken, Oenema, & de Vries, 2012), which may result in behavioral change (Donati, Chiesi, & Primi, 2013). For example, the "Stop the chance" game (see Table 1) fosters an increase in the quantity and quality of students' thinking about money spent, which was the optimal content for warning messages to reduce problem gambling (Gainsbury, Aro, Ball, Tobar, & Russell, 2015).

Although this study adds to the literature by providing support for the efficacy of a web-based gambling intervention for reducing gambling problems and gambling frequency among Italian students, there are a number of limitations. These include reliance on self-report, the relatively short follow-up period, the cluster design that randomized a small number of classes, and limited generalizability due to a modest sample form the South Italy region. Future research with objective measures of gambling and gambling-related consequences, longer follow-up periods, and more diverse samples is therefore needed. Future evaluation of the program on a larger random sample is also required. Although promising results were obtained, only a small number of

participants were classified as frequent gamblers at baseline in the control group, therefore, the results should be interpreted with some caution. In addition, another limitation was the sample that was studied, as the participants studied were not problem gamblers. Arguably, the WBI intervention may be more relevant to use among samples with gambling problems. Finally, the intervention effect sizes for significant gambling outcomes were medium-small. Other intervention strategies may be necessary to enhance brief WBI for this age group. As recent studies have shown that gambling problems are related to specific individual factors, such as motives (e.g., Canale et al., 2015b), intervention efficacy for adolescents may be improved by the development of activities based on these factors, such as computer-delivered intervention tailored to motives (Canale et al., 2015).

Results of this study have potentially important implications for developing prevention and intervention programs for high school students. First, this study provides support for the use of a WBI among ninth grade students. As the transition to high school is characterized by an increase in risky behaviors, providing evidence-based interventions via schools for this age group may be recommended. WBIs are also well suited for school-based implementation as they are brief, easy to disseminate to large groups of students within course curricula, require minimal training, and are relatively inexpensive. Second, results indicate that providing PF (without information about [for example] gambling fallacies) to FGs may not be an effective strategy for changing attitudes toward the realistic profitability of gambling. In conclusion, this study indicates that a WBI program may be an effective way to reduce gambling problems and gambling-related attitudes among adolescents.

5. Conclusion

In conclusion, the results from the current study provide an important addition to the literature on efficacious interventions for at-risk gambling. Brief interventions aimed at reducing problem gambling are becoming increasingly common (e.g., Larimer et al., 2012; Martens et al., 2015; Neighbors et al., 2015), but have been used infrequently with high school students (Donati et al.,

2013). In addition, school-based gambling prevention initiatives are limited, although a few studies have shown that they can be effective at reducing misconceptions and increasing knowledge about gambling (Todirita & Lupu 2013; Walther et al. 2013). The present study is the first controlled study to test the preliminary efficacy of a web-based gambling intervention program for students within a high school-based setting. Consequently, the present study offers a potentially promising strategy for a low-threshold, low-cost, brief intervention for at-risk gambling high school students.

Footnotes

[1] More specifically, according to the general definition proposed by Neal, Delfabbro, and O'Neil (2005) in their report to the Ministerial Council on Gambling of Australia, and adopted by Canada's Problem Gambling Research Centre of Ontario (Williams, West, & Simpson, 2012): "Problem gambling is characterized by difficulties in limiting money and/or time spent on gambling which leads to adverse consequences for the gambler, others, or for the community" (p. 125).

[2] These include gambling-related questions with interactive activities (games and quiz) through a variety of entertaining settings and trivia. These activities are designed to maximize player participation and engagement in the game while increasing youth awareness about issues related to gambling. Feedback is always provided for players during or after each online activity.

[3] For repeated measures analyses of variance, partial eta squared (η_p^2) effect sizes are reported. For Bonferroni-adjusted pairwise comparisons (t-tests), Cohen's d is reported.

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